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Conference Abstract

BIOSCAN - Revealing Eukaryote Diversity, Dynamics, and Interactions

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Abstract

Between 2010 and 2015, the International Barcode of Life (iBOL) consortium successfully completed the BARCODE 500K project, a $125 million effort that delivered DNA barcode coverage for 500,000 species. BIOSCAN is a seven-year program (2019-2025) that builds on this foundation, expanding coverage of the barcode reference library to two million species and operationalising metabarcoding for eukaryote communities globally. BIOSCAN will scan species assemblages from at least 2,500 ecosystems and will codify species interactions for at least 2,500 sites.

DNA barcoding is a well-established approach for rapid, cost-effective species diagnosis, with many applications in support of taxonomy, biosecurity, conservation, and monitoring. Uptake has been particularly significant in hyperdiverse invertebrate groups where morphological approaches to species identification are often limiting (because of the scale of diversity and the small number of expert taxonomists) or inapplicable (for example in associating individuals from different life stages). The barcode reference library maintained as BOLD Systems by the Centre for Biodiversity Genomics in Guelph, Ontario is a significant biodiversity informatics infrastructure for bridging genomics and classical taxonomy, collections research, and field surveys. Effort across multiple years in Canada has delivered a library of reference sequences for the COI mitochondrial barcode that covers most of the known insect fauna for the country, enabling a comprehensive

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assessment of Canadian arthropod diversity (Hebert et al. 2016, Langor and Sheffield 2019).

The Global Malaise Trap Program is expanding lessons learned in Canada to support species inventories in new regions such as Kruger National Park in South Africa. As DNA barcode libraries approach completeness for any site, analysis can employ metabarcoding to lower costs significantly for monitoring programs that track changes in species composition. Data from this program, and from barcode-based exploration in other regions, will greatly expand the fraction of biodiversity that can be monitored and compared over time and space. GBIF has collected more than one billion species records, but around 60% of these are for birds, with another 25% for vascular plants. Metabarcoding offers the opportunity for a wider selection of taxa to be included in global data sets and in support of local conservation and planning.

The BIOSCAN program, launched by iBOL in 2019, seeks to operationalise DNA barcoding at the global scale for development of species inventories and preliminary exploration of undescribed diversity, for surveying community composition across the world's ecosystems, and codifying species interactions (the symbiome). BIOSCAN will exploit the latest advances in sequencing platforms to lower costs, increase precision, and accelerate processing of samples, to speed the uptake of DNA barcoding for protecting life on Earth.

Presenting author

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